

## A Belated Response to Moxley

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The dialogue between Roy Moxley and me on teleology seems to be winding down, and in any case I am disengaging from it after this response. Moxley (1995) objected to one major point and two ancillary points I made in my 1994 article (Reese, 1994). The major point is about the implication of backward causation in classical teleology; it is important because it still taints the concept of teleology. The ancillary points are about teleology in Aristotle's system, which is important only for historical accuracy, and Newton's position on unmediated action over a distance, which is important because it provides a precedent for ignoring the question of what might mediate across the temporal gap between a history of reinforcement and current behavior.

### *Backward Causation*

Contrary to Moxley (1995), the acceptance of backward causation in classical ("cosmic") teleology is well documented. It was acknowledged by Bernstein (1971, p. 42), Boden (1972, pp. 26–27), Imam (1989), James (1907/1981, pp. 52–54), Janet (1884, pp. 54–55), Mayr (1982, pp. 47–51, 1992, p. 134), Murray (1991), and Ringen (1993, footnote 1, p. 10), among others, and it led almost all of these authors to reject classical teleology. Modern teleologies deny backward causation, as Moxley noted, but they are still disreputable, perhaps because they still connote backward causation. Their disrepute is demonstrated, I believe, by the number of authors who

rejected all forms of teleology or tried to make some forms acceptable (e.g., Bunge, 1973, pp. 45–49, but referring to biology and the physical sciences and excluding the behavioral sciences; Feigl, 1950/1953; Hempel & Oppenheim, 1948; Matson, 1964, p. 161; Mayr, 1982, pp. 47–51, 1992; Moxley, 1991; Nagel, 1953, 1979; Ringen, 1993; Russell, 1929/1953; Schlick, 1925/1953; Skinner, 1963; Spiker, 1986, p. 38). No such arguments have appeared about the concepts of material, formal, and efficient causality, presumably because nobody ever denied their acceptability (although Hegel said that efficient cause without final cause is blind; 1830/1892, p. 344).

The disrepute of teleology is also reflected, I think, in the pleasure apparently felt by Engels (1859/1983), Marx (1861/1985), and Huxley (1896/1970) in announcing that Darwin had dealt a death blow to teleology. Huxley also said, "Far from imagining that cats exist *in order* to catch mice well, Darwinism supposes that cats exist *because* they catch mice well" (p. 85). Similarly, although Mayr (1992) did not explicitly say so, his arguments lead to the conclusion that adaptation is not the *goal* of evolution but rather is the *result* of natural selection. Analogously, operant behavior occurs not *in order* to obtain reinforcers but *because* it has previously been reinforced; obtaining reinforcers is not the *goal* of operant behavior but rather is the *result* of operant behavior.

### *Aristotle and Teleology*

Moxley (1995) cited Mayr (1992) as evidence that Aristotle's system was not teleological and cited Ferré (1973) as evidence that Aristotle did not use an argument from design to prove

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God's existence. However, (a) Mayr did not make the point Moxley attributed to him; (b) Mayr's actual point is not only irrelevant to the argument in my 1994 article, it is also incorrect; and (c) Ferré made the point Moxley attributed to him, but it is consistent with my argument.

Mayr (1992) cited several secondary sources and quoted from one—Grene (1972)—not as evidence that Aristotle's system was nonteleological but as evidence that Aristotle's teleology did not involve purpose. Grene's article does not support Mayr's point because contrary to his implication, Grene's discussion was not about purpose in general but was restricted to kinds of natural processes for which the telos is "the intrinsic endpoint" (Grene, 1972, p. 397), such as the hatching of a baby robin rather than an oak seedling from a robin's egg (p. 398).

My argument was about purpose in nature, which was assumed in classical teleology, not about purpose as such, which would include purpose in humans. Purpose in humans is not problematic because it is antecedent to the behavior it affects (e.g., Aristotle, 1915, 1189a 8–11; Boden, 1972, pp. 25–27; Day, 1976; Matson, 1964, p. 161; Pepper, 1967, chap. 2; Robinson, 1896, chap. 5). However, contrary to Grene (1972), Mayr (1992), and Moxley (1995), but as demonstrated by Ferré (1973), Aristotle gave numerous examples relating teles to purposes, not only with respect to teleology in humans but also with respect to the kinds of teleology Grene discussed.

Ferré's (1973) point was that Aristotle believed that purpose is immanent in nature rather than imposed by God. This point is consistent with my interpretation of Aristotle's concept of purpose in nature—I cited Aristotle as an example of a nontheological use of argument from design (Reese, 1994, p. 77).

Secondary sources indicating that Aristotle's system was teleological include Ferré (1973, p. 672), Hegel (1830/1892, p. 345), Pepper (1967, p.

379), and Mayr himself (1982, p. 50), among others. Good primary sources, which I cited in my 1994 article, are five works in which Aristotle referred to purposes in nature, such as purposes for locating the soul in the heart (the Aristotle references are in Reese, 1994, p. 77). These instances of his actual uses of teleology are more informative than his formal definition of final causes (discussed in Reese, 1994, p. 86), which is what Moxley and many others have relied on.

### *Newton's Action at a Distance*

Newton believed that action over a distance requires a chain of contacts with no unfilled gaps. In a relevant statement, which Moxley quoted, Newton (1934, p. 634) said that the idea that action across a distance can be unmediated is absurd. Therefore, Moxley was correct in saying that I erred when I said, "Newton did not deny action over a distance" (Reese, 1994, p. 86). I should have said, "Newton believed that action over a distance must be mediated, but he refused to hypothesize any mediator and gave his belief no role in his science." The arguments for this version are given in the following paragraphs.

Moxley (1995) quoted Newton's statement about the absurdity of unmediated attraction from Cajori's 1934 edition of Newton's *Principia Mathematica*, but the statement is from one of four letters Newton wrote to Richard Bentley in 1693 (the fourth letter, dated February 25) rather than from the *Principia Mathematica* as such. In two of these letters, Newton said that the mediating agent is God (Koyré, 1965, p. 149; Newton, 1961, letters 1 and 2, pp. 233–241). Newton evidently did not intend publication of the letters, although they were in fact published in 1756 by Bentley's executor (Koyré, 1965, footnote 1, p. 202), 29 years after Newton died and 14 years after Bentley died. Thus, Newton's personal belief, unpublished as far as he knew, was that unmediated gravitational at-

traction is an absurdity and that God is the mediator. However, as shown in the next paragraph, the *scientific* view that Newton authorized and published in *Principia Mathematica* was that gravitational attraction does not require specification of any mediating agent. In short, no matter how absurd Newton personally believed the idea to be, he said that the issue is outside the purview of his science.

Newton's (1713/1973) statement, "Hypotheses non fingo" (p. 484)—"I do not feign hypotheses" (Koyré, 1965, p. 35; mistranslated as "I frame no hypotheses" in Newton, 1729/1971, p. 392)—referred to gravitational attraction across a distance and meant that he refused to hypothesize any mediating agent (Cohen, 1952, p. xxiv; Koyré, 1965, p. 149). His mediating agent was therefore occult, as noted by Cartesians and by Leibniz (Koyré, 1965, pp. 56, 139), and if the belief that a mediating agent is required was intended to be a scientific principle, Newton's account of gravitational attraction was occult and unscientific. In other contexts, Newton rejected occult concepts; therefore, his belief should be interpreted as dogmatic rather than scientific. Consequently, my conclusion (Reese, 1994, p. 86) that Newton's account did not require a mediator is fully justified.

Moxley (1995) cited a secondary source referring to "Questions 18–24 in his [i.e., Newton's] *Optics*" (Moxley, p. 364) to demonstrate that Newton in fact proposed a mediator of gravitational attraction—"ether" (Moxley's italics, p. 364). Newton indeed suggested in his Query 21 that gravitational attraction is mediated by "Æther" (1718/1970, p. 326) and in the same query he speculated about the nature of ether. However, in the same query he also acknowledged that he did not know what ether is. Furthermore, in another query he said that the attractions "reach to very sensible distances" and that he did not know "the cause by which the attraction is performed," and he declined to speculate

about the cause (Query 31, p. 351). (I modernized the alphabet, capitalization, and spellings in the foregoing and following quotations, except in the word "Æther.")

The relevant queries were in the second English edition of *Opticks*, published in 1718, but were not in the first English edition, published in 1704. Newton's "Hypotheses non fingo" was in the second edition of *Principia Mathematica* (1713/1973), between these editions of *Opticks*, and was echoed in the second edition of *Opticks*: "The main business of natural philosophy is to argue from phenomena without feigning hypotheses" (Newton, 1718/1970, Query 28, p. 344). The queries in *Opticks* were speculations, not arguments from phenomena, not hypotheses, not scientific principles. Their speculative nature is very clear in Query 28, in which he used moot questions to suggest design in nature and implied that the design was God's work.

These considerations indicate that Newton's position is consistent with the point that I made (Reese, 1994, pp. 85–86) and that Moxley (1995) challenged: The effect of a history of reinforcement is a phenomenon and the invention of a trace to mediate the effect is neither necessary nor helpful (Williams, 1995, and Marr, 1996, made the same point), just as mutual attraction across a distance is a phenomenon and inventing an unprovable mediating agent is neither necessary nor helpful.

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